THE ACORN USER HANDBOOK

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NOTE: In this handbook the word 'Archimedes' has been used to refer to any Acorn 32-bit machine. The book is written for Risc OS 3, but the majority of the material also applies to Risc OS 2 users; however some of the features mentioned in the text may not be present on the earlier operating system, or may operate differently.

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The Insider's Guide to Hardware

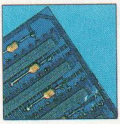
The Archimedes is a powerful beast, and with a sound knowledge of how the insides of your machine work you can really start to use it to its full potential. This section of the handbook explains how all the physical pieces fit together, and how to make the most of them.

The Arm chipset forms the heart of your machine. There are four main chips that do the work in your Archimedes: their names are Arm, Memc, IOC and Vidc. By far the most important of these is the Arm chip, as this is the workhorse of the four. It essentially executes instructions, and the faster it can do this, the faster your machine will run your applications.

There are a number of different Arm chips, ranging from the lowly Arm2 up to the powerful Arm7 series, and Arm Ltd, which designs the Arm chipset, continues to extend the range. The Arm2, which is used in old Archimedes machines like the A400/1 and the A3000, is the slowest of the lot; next up is the Arm250 as used in the A3010, A3020 and A4000; then there is the Arm3 in the A5000 and A4; and the Arm6 and Arm7 are even faster still.

Memc looks after your computer's memory, Vidc controls the picture on your monitor and the sound output, and Ioc looks after interfacing with the outside world. Another chip, the Floating Point Accelerator (FPA) can be fitted to certain machines to speed up mathematical operations.

The Arm250 is a special case, as it contains an Arm2, Memc, IOC and Vidc all in one silicon chip; this enables it to run slightly faster than an Arm2.



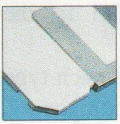
Memory is an essential part of any computer system, and comes in two flavours: Rom and Ram. Rom (Read Only Memory) is a permanent store, and on the Archimedes the operating system (Risc OS) is provided on Rom, as is any controlling software on expansion cards. The only time you really need to worry about Roms is when performing an upgrade, such as replacing the old Risc OS 2 operating system with the newer Risc OS 3.

Ram (Random Access Memory) is far more important as far as using your computer is concerned. In fact, when people refer to your machine's 'memory', they normally mean Ram rather than Rom. The computer's Ram is the place where programs are stored, where documents live when they are loaded, where font definitions are created: Ram is an impermanent storage device, which differs from a permanent storage device such as a floppy disc in that turning your machine's power off will erase anything in Ram. That's why you must always save work you want to keep before switching off. Think of Rom and Ram as like CDs and tapes: they both store the same sort of information, but you can't record onto CDs, and you can onto tapes.

The amount of Ram in your machine radically affects how powerful it is: if you have too little memory then it is hard to run more than a few applications at the same time, but if you have a lot of memory, you can have large font caches, Ram discs, big sprites in DTP documents and so on. Ram is measured in megabytes (Mb) and kilobytes (K), where 1Mb is 1024K. The more memory you have, the better: you can never have too much.

Machines such as the A3000 and A3010 come with 1Mb of memory as standard, and this is fine for running games or using a couple of applications on the desktop at any one time. However, 1Mb is simply not enough for serious DTP or database work, and 2Mb is regarded as the minimum necessary to really use your machine. Upgrades to 4Mb

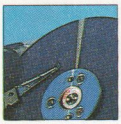
are available for all Archimedes, and upgrades to a whopping 8Mb are available for most of the larger-case models.



Floppy discs are used to store data. As everything in your computer's Ram is erased when the power is turned off, you have to save documents to disc if you don't want to lose them. Every Archimedes is fitted with a 3.5in floppy disc drive, and the latest models (from the A5000 onwards) have a special high density drive which can read HD discs. A standard disc can hold 800K of data, which means that you can store about 450 pages of this size on one floppy disc. HD discs can store twice as much data as this, giving 1.6Mb of space.

Before a disc can be used it must be formatted. The most common Archimedes format is ADFS 800K (E), though you can read discs with all sorts of formats. For example, if you format a disc on a PC (so-called Dos format), then you can read this on your Archimedes.

Floppy discs are the standard way of providing programs. When you buy a software application, such as a desktop publisher or a spreadsheet, it will be provided on floppy disc.



Hard discs are similar to floppy discs in the sense that they also allow you to store data permanently. However, that's where the similarity ends. A hard disc is a lot faster than a floppy disc, and can store far more data. Hard disc sizes are measured in megabytes (like your computer's memory), and although 20Mb sounds like a lot, you will find that 40Mb is the smallest useful size. Some Archimedes (such as the A5000) come with a hard disc already fitted, and any Archimedes can have a hard disc added.

There are three main types of hard disc which can be fitted to an Archimedes: ST506, IDE (Integrated Drive Electronics) and SCSI (Small

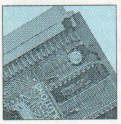
Computer System Interface). ST506 is the type fitted to the A400 series, and is now considerably out of date. The only point in buying an ST506 drive would be to fit one to an A410/1, as this already has an ST506 controller fitted to the motherboard.

IDE and SCSI are both still current and each type has its devotees. IDE is very cheap and compact, is sufficiently fast, and is the type that Acorn chose for its A5000, A4000 and A3020 computers. SCSI, on the other hand, is faster than IDE and allows much more flexibility as far as expansion is concerned. If your computer has a SCSI card fitted, then you can hook up any SCSI devices, including tape streamers, removable hard discs, magneto-optical drives, and CD-Rom drives. The only drawback of a SCSI hard disc system is that it is more expensive than the IDE system.

Ports are the sockets and plugs on the back (and sometimes the front) of your computer. Each machine has a different collection of ports, but there are some which are common to all Archimedes machines. The serial port enables you to connect serial devices such as modems and serial printers; the parallel port is for connecting parallel printers, and software protection devices called 'dongles'; the monitor and keyboard ports are for connecting a monitor and the keyboard; and the headphone socket will take standard 3.5mm headphones. Other ports include TV output (only on the A3010), Econet for networking, and connectors for joysticks. Adding expansion cards (see the next chapter on peripherals) increases the number of ports on your machine; for example, adding a Midi card will give you Midi ports.

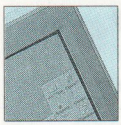
The Insider's Guide to Peripherals

There is a huge range of peripherals available to hook up to your machine, ranging from the very cheap to the ridiculously expensive. The trick lies in picking the add-ons which will be sufficient for your present needs, but will not hold you back later. Here's a mouth-watering look at what you can buy to turn your humble base-model into a supercomputer.



Expansion cards, or **podules** as they are often called, can be added to any Archimedes. Some peripherals need their own dedicated expansion card, and others simply plug into one of the standard ports. Using expansion cards you can add such goodies as scanners, external hard discs, fax modems, digitisers, sound samplers; the list goes on and on and is covered in the rest of this chapter. Software to support these cards is provided in one of two ways: in Rom on the board itself, so the software is present as soon as you turn on your machine; or on floppy disc, so you have to load up an application to use the expansion card.

The main point to note about expansion cards is that they come in a number of sizes. Full-sized Archimedes, like the A5000 and A400/1 series, have a 'backplane' into which expansion cards plug. You can plug in up to two double-width cards, or four standard-width cards. On the A3000, A3010, A3020 and A4000 you can plug in only one mini-expansion card, which is specially sized for these computers. And, just to add to the confusion, HCCS' Ultimate Expansion System enables credit card-sized micro-podules to be fitted to any Archimedes, so enabling up to three expansion cards to be fitted to the smaller machines.



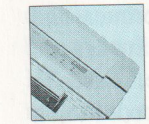
Monitors are essential for any long-term use of an Archimedes. If you have an A3010 and you are using it with a standard television, you will notice that the picture quality is somewhat blurred: a monitor is a dedicated display device specifically for use with a computer, and the quality of display is far superior to a television.

There are three different types of monitor which will work with the Archimedes: standard, VGA and multisync. Standard monitors are becoming rather old hat these days, but they are cheap and are fine for playing games. Standard monitors can display a maximum of 640 × 256 pixels (dots, in other words) as in Mode 12, and although this is adequate for most uses, anti-aliased fonts do look jagged and the display quality is not recommended for lengthy sessions.

VGA monitors come from the PC world, and they can display an improved resolution of 640 × 480 pixels, as in Mode 27. You can hook a VGA monitor up to any Archimedes with a new 15-pin monitor port, but not the older machines with 9-pin sockets. VGA monitors are cheap, but be warned: you cannot display standard modes like Modes 12 or 15, and this can cause problems with games.

Multisync monitors, on the other hand, combine the best of both worlds. Risc OS provides multisync modes with a resolution of 640 × 512 pixels, and multisync monitors can display standard modes, VGA modes and multisync modes. Some multisyncs (such as the Taxan 795) have problems with older machines in standard modes, but fitting a Vidc enhancer (available from most Acorn dealers) to your machine will solve this problem.

Acorn supplies two types of monitor with its machines: the AKF30, which is a standard monitor, and the AKF18, a multisync. The quality of the AKF18 is not as good as most other multisyncs, and, if possible, it is a good idea to shop around. The most popular multisync monitors for the Archimedes are those produced by Taxan and Eizo.



A **Monochrome Printer** is one of the most popular peripherals to add, as almost everyone needs to print out their work at one time or another. The variety of different types of printer is bewildering. and the choice ultimately depends on the print quality you require, and the price range.

Starting at the bottom, the cheapest type of printer is the *dot-matrix* printer. These printers contain a print head with a number of pins which are hammered through an ink ribbon, impacting the paper and leaving a mark. The more pins there are in the head, the greater the print resolution and the better the quality of the printout, so a 24-pin printer will produce better quality prints than a nine-pin printer. The advantage of dot-matrix printers is that they are very cheap. However, they are very slow, exceedingly noisy and produce low quality output. Star's range of dot-matrix printers is the most popular for Acorns, but the technology is dated and cannot really be recommended.

The latest craze in the printer industry is the *ink-jet*, or *bubble-jet* printer. In an ink-jet printer there is a print head which contains little ink 'guns' instead of pins: these guns fire tiny drops of ink onto the page to create the printout. All this means that printing is almost totally silent, and the quality is far higher than dot-matrix output, as the ink droplets are tiny. Ink-jet prices are higher than for dot-matrix printers, but not desperately so. The most popular ink-jet printers are Hewlett-Packard's DeskJet range, and Canon's BJ range.

Laser printers produce the best quality output of the lot, but they also cost the most. Laser printers work on the same sort of basis as photocopiers: the image is 'drawn' on a drum by a laser; it is then transferred to the paper as static charge, and toner (fine powdered ink) sticks to the page on the right places. A quick burst of heat fixes the ink to the page to create the final printout. Laser printers are quick, reliable and produce very high quality output. However, they are expensive.

. There are a number of types of laser printer, and the three main types used with the Archimedes are LaserJet, PostScript and Direct Drive. LaserJet printers need Hewlett-Packard LaserJet codes to be sent to describe the page, and this can take some time. However, absolutely anything you see on the screen can be printed faithfully. PostScript is a page description language developed by Adobe in the early 1980s, and the major advantage of it is that any PostScript file can be printed on any PostScript printer. So, if you use the printer manager to print a PostScript file, you can send this to a typesetting agency, and they will be able to print it for you. PostScript is reasonably quick when text is printed, but printing graphics can slow it down considerably.

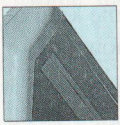
The fastest laser printers are direct drive printers, such as Computer Concepts' LaserDirect range. These printers come with an expansion card and dedicated printer manager software. The reason they are so fast is that the computer itself assembles the image in memory, and as the Arm chip is so fast, this takes less time than most printers. When the image is assembled, it is sent out to the printer, which is in fact a dumb engine without any 'brains' of its own. The only disadvantage of direct drive printers is that they are specific to one system, so an Archimedes direct drive printer system cannot be plugged into a Mac or PC.

The choice when it comes to **Colour Printers** is more limited: dot-matrix or ink-jet. Dot-matrix colour printers use a multi-layered ribbon, and the quality, as for monochrome versions, is poor but cheap. Ink-jet printers, on the other hand, can produce good quality colour prints in less time and with considerably less noise.

Colour ink-jet printers come in a variety of flavours. The most basic ones (like the HP 500C) come with one cartridge, which contains cyan, magenta and yellow ink. To print black, all three

colours are printed together, which leads to a rather brown-looking black. The next step up (as in the HP 550C) has two cartridges: one with cyan/magenta/yellow and one with black, so blacks are actually black. The best of the lot have four cartridges, one for each colour.

The most important consideration when buying any printer (but especially colour printers) is to make sure you can get a printer driver for it. It's a waste of money to buy a colour printer only to find you can only print in black and white because there isn't a suitable driver available. Dealers tend to bundle drivers with printers, and Acorn supplies a number of colour printer definition files with Risc OS, but some drivers are better than others. For example, Computer Concepts markets a range of printer drivers called TurboDrivers which are considerably faster than the normal Acorn printer manager, and Ace Computing has its ProDriver range, which provides improved print quality and features.



Scanners are effectively the opposite of printers: they take images from paper and create sprites on the computer. Scanners come in two basic flavours, hand-held and flatbed, and can scan in monochrome, greyscales or colour. With hand-held scanners you drag the scanner over the page you wish to scan, and with flatbed scanners you simply put the page into the scanner, and the scanner controls the movement of the scanning head over the page.

Hand-held scanners can produce good quality scans, but you do need a steady hand if you want to avoid wavy sprites. In the Acorn market most hand-held scanners are monochrome or greyscale. Flatbed scanners produce higher-quality scans, but do cost considerably more than hand-held versions.

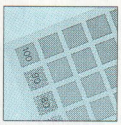
Scanners vary in their specifications, most notably in the number of colours they can produce, and the maximum resolution of the scan. Mono-

chrome scanners can produce sprites with only black-and-white pixels, and are somewhat out of date these days. Greyscale scanners scan in grey levels as well, and 256 greys is the standard to go for. Colour scanners provide the best range of options as they can scan in monochrome, greyscale and colour.

Resolution is measured in dots per inch (dpi). Resolutions vary from about 100dpi to around 1200dpi, with the higher value giving higher quality sprites (which take up more memory). 200dpi is the minimum resolution for serious scanning, and 400dpi produces good quality scans.

Video Digitisers produce sprites like scanners, except they take a television signal as input. Digitisers can grab frames in colour or monochrome, and resolutions vary. Some digitisers work in real-time, which means they can display the input signal in a window on the desktop and you can grab a frame as a sprite at any time.

Digitisers almost always come with some kind of image processing package which will allow you to alter contrast, brightness, colours and so on. However there are sophisticated image processing packages available if the bundled software is not powerful enough (see page 29).



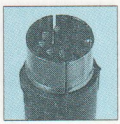
Adding a **Colour Card** to your computer increases the resolution and range of colours you can display on screen. Although you do not need to add a video card to an Archimedes to use software (as you often have to on a PC), art packages benefit immensely from the increased palette available, especially if 24-bit files are being created. The screen size is also increased, so you can view more DTP documents at the same time, for example.

The two major colour card manufacturers are State Machine and Computer Concepts. Both produce cards with roughly similar specifications.

Modems and Fax Cards enable your computer to be connected to the phone line. Modems plug into the serial port. The most important consideration when buying a modem is its speed, which is described in bits per second (bps); an alternative word for bps is 'baud'. The slowest modem these days can send data at 2400bps, with the next step being 9600bps, followed by 14400bps. Files can be transferred via modem using special file transfer protocols (ftp) like Zmodem and Kermit, and the average rate of transfer when using compression utilities can be around 24K per minute for 2400bps, 100K per minute for 9600bps, and 150K per minute for 14400bps. Every modem has a so-called 'V' number, which tells you how fast it is, and the higher the number, the faster the modem, so a V22 modem isn't as fast as a V32 modem. The suffix 'bis' (as in V32bis, for example) means that the modem has some extra or improved features on top of the standard.

Some modems include the ability to send and receive fax messages, and the Archimedes can access this facility using the *ArcFax* package from David Pilling.

The Computer Concepts FaxPack is an expansion card which enables you to print documents to a fax as if it was a printer. The card also lets your computer send files to other machines fitted with FaxPacks simply by dropping them onto the FaxPack printer icon.



Networking involves connecting machines together by cable so they can communicate, and share resources such as printers. On the Archimedes there are two main types of network available, namely Econet and Ethernet.

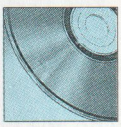
Econet is Acorn's proprietary networking system which was invented in the early 1980s for the Atom and BBC range. It hasn't changed a great deal since then, and is now regarded as rather slow.

However, it still lives up to its name (ECOnomy NETwork), and is cheap to install both in terms of fileservers and machine interfaces.

Ethernet, on the other hand, is an industry standard and is considerably faster than Econet, though it is also more expensive. Ethernet comes in three types, namely 10Base5 (Thick), 10Base2 (Thin) and 10BaseT (Twisted pair). 10Base2 is low-cost and needs less space than the other two systems; 10BaseT is easy to install, is more reliable but is slightly more expensive.

Individual network clusters (a cluster is simply a set of machines on the same network) normally have a fileserver, which is a machine with a hard disc that can be accessed by other computers on the network. The fileserver runs special software to enable the network to access it: on Econet this software is called Level 4, and on Ethernet it is called TCP/IP. A lot of networks also contain a printer server which allows machines on the network to share the same printer.

The concept of the Acorn Universal Network (AUN) enables Econet and Ethernet networks to be connected together in a way that is transparent to the user. If a card is supplied with the AUN software (normally in Rom on the card) then two network clusters linked together (across what is known as a 'bridge') can access each other regardless of their types.

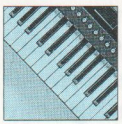


CD-Rom Drives hook up to the Archimedes via a SCSI card. CD-Roms are based on exactly the same technology as music compact discs, and can store very large amounts of data (up to about 660Mb); the only disadvantage is that they are quite slow compared to hard discs.

CD-Roms are usually used as the format for large multimedia applications, such as newspaper databases, encyclopedias, and anything containing large amounts of video. You cannot write to a CD-Rom, but apart from that it acts exactly like a very

large disc, with a compact disc icon on the left-hand side of the iconbar.

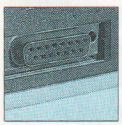
The latest buzz-word in the world of CD-Rom is PhotoCD, Kodak's method for transferring photographs onto CD-Rom. However, not all CD-Rom drives are capable of reading PhotoCD discs completely, because they are not 'multi-session'. When photographs are put onto CD-Rom, they are placed there in batches called 'sessions', and most existing CD-Rom drives can only read the first session. New drives, however, are almost always multi-session capable, and the drive in the Acorn Multimedia Unit, for example, is a double-speed (300K/sec) multi-session drive.



Midi stands for Musical Instrument Digital Interface, and adding a Midi interface to your Archimedes enables you to hook it up to any musical instrument with a Midi port. You can then control the instrument from the computer using suitable sequencing and instrument control software (see pages 30 and 31).

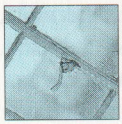
A sequencer is effectively the musical equivalent of a word processor. You can record and edit music on screen, and can even save your masterpiece as a standard Midi file: you can then play your composition on any Midi sequencer with a disc drive.

Theoretically Midi can be used as a control interface, like the User Port, though nothing has been produced which uses this facility.



The old eight-bit BBC had two very popular ports, namely the **User and Analogue Ports**. These do not come as standard on the Archimedes, but can be added on a separate card. There are not many Archimedes-based peripherals which use the User or Analogue ports, but as the BBC was so popular in schools there is a lot of eight-bit educational software and hardware which requires one of the two ports.

The User port provides two rows of digital outputs for controlling such devices as turtles, special keyboards and teletext receivers. The Analogue port measures voltage and can be used in scientific analysis. Despite this, the most popular use for the Analogue port on BBCs was as a joystick interface.



If you need to make your Archimedes PC-compatible and the PC Emulator is too slow, you can add a **PC Card**. PC Cards are available in two configurations, 386 or 486, with the latter being the faster of the two. Adding a PC Card to your machine effectively gives you a PC in a desktop window, so you can run Windows in Risc OS. The main manufacturers of PC Cards are Acorn and Aleph One.

Despite the fact that a PC Card costs nearly as much as a cheap PC clone, the advantages are obvious: one machine instead of two, easy transfer between Risc OS and Dos, and total compatibility with all PC software, which is not the case with the PC Emulator.

Joysticks are a must for serious games players. You can connect two standard nine-pin joysticks to the A3010 straight away, but other machines need special joystick interfaces, such as the one from Leading Edge.

Most games written since the release of the A3010 will work with the standard A3010 joystick interface, but those written before the A3010 don't work and most haven't been upgraded. This is where products like Leading Edge's *Joymaster* come in, which allows you to tailor older games to use the A3010 joystick interface.

The Insider's Guide to Risc OS

Risc OS is the most important program your computer will ever run. It is supplied inside every Archimedes and looks after everything the machine does, from displaying windows on the desktop to monitoring the keyboard for keypresses. Understanding Risc OS means you can really use your machine to its full potential.

Shared resources

A knowledge of how Risc OS shares resources is vital for an understanding of how applications interact with the operating system and each other. There are three applications which provide shared resources: *System*, *Scrap* and *Fonts*.

These three applications are provided with Risc OS, and if you have a hard disc they will be in the root directory. Briefly, their functions are as follows:

System contains modules which applications may want to use.

Scrap provides an area where applications can store temporary files.

Fonts contains any outline font definitions on top of those present in Rom.

Every time you use your computer, you should make sure that the operating system knows where these three applications are stored. There are two ways of doing this. The first, and easiest, is simply to open the directory window in which they are stored: this is known as 'seeing' the applications, so if you ever get a message along the lines of 'System resources cannot be found', just open the relevant directory.

The second method is to create a boot file (see page 23) which runs the applications as soon as you turn on your machine. This is definitely the preferred method.

Another important point is that *Scrap* must not be stored on a write-protected disc, as applications must be able to write their temporary files to it. This is only relevant to floppy users. Also, because floppy discs are quite slow, a handy time-saving tip for floppy systems is to copy *Scrap* to a Ram disc (created using the Task manager) and run it there (by double-clicking on it). Temporary files are now stored there, which is quick and stops you having to insert the floppy containing *Scrap*.

As a final point, adding modules to the system folder is slightly complicated if you haven't seen it before: see the section on page 22. Most applications which need their own modules provide an application called *SysMerge* which automates the process, but it is useful to know how to add them manually.

Configuring your machine

A machine which is correctly configured will work more efficiently and it is vital to tailor your computer to your needs. The main way to configure your settings is by using the *Configure* application. *Configure* has a number of sections; the following breakdown shows the most important ones.

Mouse changes the speed of the mouse pointer, and is largely a matter of personal preference. There are some occasions when a temporary change in mouse speed can save the day; for example, selecting thin vertical line objects in *Draw*, or thin frames in *Impression*, can be impossible with a fast mouse speed, as the pointer jumps over the object; slowing the mouse down enables you to select the object. We find that the middle mouse speed is the best setting.

Keyboard sets the speed of repetition if a key is held down. This almost certainly needs speeding up, as the factory setting is a little slow. The delay value is all right, but changing the repeat value to 3 centiseconds makes moving the cursor around documents with the arrow keys that much slicker.

Memory allocation is an important section, and the optimum settings depend on the total amount of memory you have in your machine. It is very important to set the font cache correctly. Whenever a font is loaded from disc, a bitmap is constructed in memory from the outlines: this bitmap is stored in the font cache. If the font cache is too small then it has to be expanded, up to the size given in the font cache limit setting. If you use a lot of outline fonts, or simply use a few fonts in a number of sizes, then you should have a large font cache set: on a 1Mb machine, a sensible setting is about 64K; on a 2Mb machine, try 128K; and on a 4Mb machine, 256K or higher is recommended.

Screen deals with various screen attributes. The blank delay refers to the screen blanker, which will black out the screen if there is no activity on the computer for a certain time. Do be warned: it is not unheard of for someone to turn on a computer, only to find that it was in fact already on but had the screen blanked, and that they have just turned it off, losing data.

The **Fonts** window controls various aspects of the font manager. The first value determines when the font manager should give up trying to anti-alias, as it is quite a memory hungry process. The second value decides whether bitmaps for large characters should be stored in the font cache. At *Acorn User* we use a lot of large fonts and have 4Mb machines, so our setting is 36pt for both these settings.

Common error messages

Abort on data transfer and **Address exception** are errors you really don't want to see. They both mean that the application is trying to access memory which does not exist, and effectively mean that the application has got something very wrong indeed. Save everything you can, quit the offending application and then re-run it. If the error keeps occurring, contact the company that produced the package.

Application needs at least xxK to start up is an easy error to fix: it simply means that there is not enough free memory to run this application. Make some more room by quitting other applications and removing the Ram disc if you have one.

Disc error is another bad one: it means the disc you are trying to use has a defect. Repairs are possible if you have valuable data on the disc, using, for example, *Archimedes Disc Rescue* from LOOKsystems. To reuse the disc, try reformatting it, and if that fails, throw it away.

File open means that an application has opened a file for access, and hasn't closed it (possibly due to premature termination). To fix this problem, press F12, type `Close` and try to access the file again. If this fails, press F12, type `Shut` to shut files on all filing systems, and have another go.

No run action specified for this file type means that the computer doesn't know how to load the file you have just double-clicked. If the file is of type Data, for example, then it's obvious why this message appears, but what if it's a file which you know should load automatically into an application you have on disc? Well, when the computer is first switched on, it does not know

how to load most file types: it can cope with text files, sprite files, *Draw* files and so on, but if you have *Ovation* the computer can't possibly know how to load *Ovation* files without 'seeing' the *Ovation* application. The way to do this is to open the directory containing the application; it is then 'seen' by the computer (in the same way that the system, scrap and font folders need to be 'seen'), and double-clicking on the file will no longer give this error.

Protected disc simply means you have tried to write to a write-protected disc. Simply slide the little tab on the disc so you can't see through the hole, and try again.

System resources cannot be found and **Can't find scrap directory** are similar errors: they mean that the computer hasn't seen the system folder and the scrap application, so all you need to do is open the directory containing these applications and the error will go away.

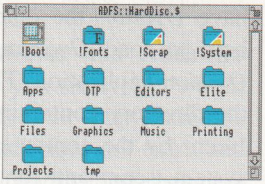
The best way to avoid this problem is to set up a boot sequence (as described on page 23). This will 'see' *System*, *Scrap* and *Fonts* automatically, as well as 'seeing' any other applications you want; this will avoid the 'No run action specified for this file type' error described above.

You need SharedCLibrary 3.75 or later means that the version of the SharedCLibrary module (in this example) in your system folder is out of date and you need to update it. Updating the system folder manually is described on page 22.

!Printers needs PDriver 3.16 or later is related to the last error, except the solution is not as obvious. If you use a Risc OS 2 printer driver on Risc OS 3 and then try to load the printer manager, you'll get this error. Press F12, type `RMKill PDriver` and then load the printer manager.

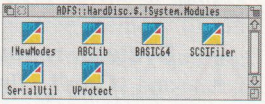
How to add modules to the System folder

1. Open up the directory which contains your System folder (*!System* in other words).



2. Double-click on *!System* while holding down SHIFT. Another window will open, which shows the contents of the system aplication directory.

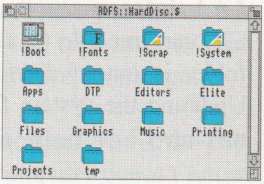
3. Double-click on the *Modules* directory. Yet another directory window will open. This directory will contain some of the modules shown opposite, but not necessarily all.



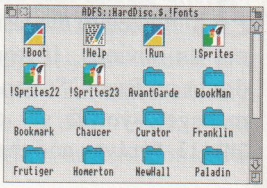
4. Drag the modules you want to add into this directory. This is where applications look to find shared modules, so add new versions of shared modules here.

How to add fonts to the Fonts folder

1. Open up the directory which contains your Fonts folder (*!Fonts* in other words).

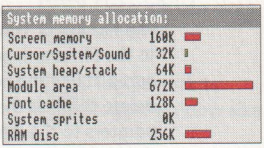


2. Double-click on *!Fonts* while holding down SHIFT. Drag any font definitions you want to add into the window which opens. Finally, double-click on *!Fonts* to install them.

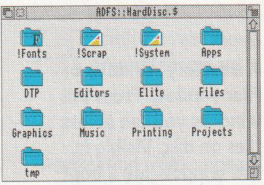


How to create a desktop boot file

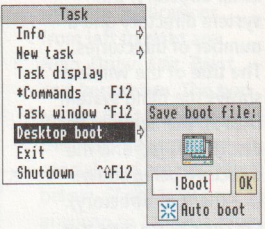
1. Set up your system in the state you would like it to be whenever you turn it on. Applications loaded, memory allocation, windows, the Pinboard: all these are recorded.



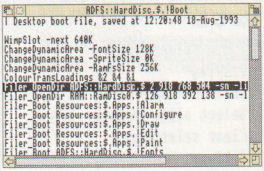
2. Open up the root directory for your boot disc. If you have a floppy-only system, this will be the floppy containing your system and scrap folders. If you have a hard disc, it will be the root directory.



3. Click Menu over the Task manager icon (the Acorn on the far right of the iconbar) and move into the Desktop boot submenu. Drag the file icon to your boot disc, where a file called *!Boot* will be saved containing details of your system setup.



4. If you do not want the directory viewer for your boot disc to appear when you boot up, load *!Boot* into *Edit*, find the line beginning Filer_OpenDir which contains the name of your boot disc, delete that line, and resave *!Boot*.



5. Now for the final step. Press F12, and type the following, pressing RETURN after each line. Press RETURN twice at the end to get back to the desktop.

```
ADFS
Mount 4
Opt 4 2
Configure FileSystem ADFS
Configure Boot
Configure Drive 4
```

If you are saving onto a SCSI hard disc, change the two occurrences of ADFS to SCSI.

If you are saving onto a floppy disc, change the two 4s, in the first and last lines, to 0. Do not change the 4 in the Opt line.

Finding your way round the desktop

The Pinboard. You can drag any files, directories or icons to the Pinboard, and they will stick there. The Pinboard acts just like the normal Filer, but deleting icons does not delete the files themselves: the Pinboard icons are just pointers to the items on disc. You can save the state of the Pinboard, or include the details in a boot file so your favourite applications appear every time.

A typical desktop window. In this case it is a document in an editor (*Impression*). This particular window has cream-coloured icons, which means it has the input focus: any keys pressed will be reported to this window, so any text typed will appear in this document, and any function key-presses will relate to *Impression*. The window could be iconised onto the Pinboard by clicking on the close icon with SHIFT held down; an icon would appear on the Pinboard, and double-clicking on that icon would bring the window back.

Back: click to put window to back

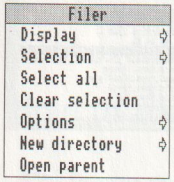
Close: click to close window

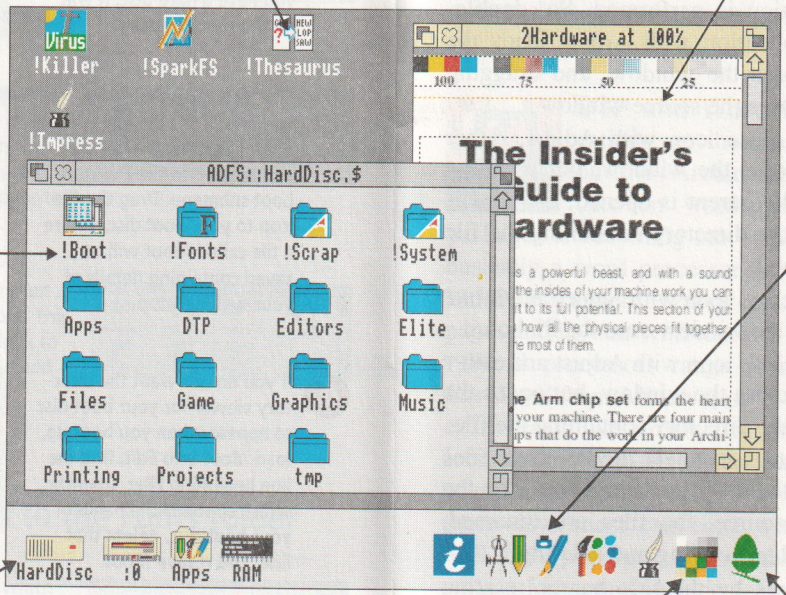
Toggle: click to toggle window size

Size: drag to alter window size

Scroll arrows: move around document

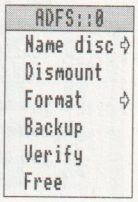
A directory window, or Filer window. From this window you can access files on disc. Visible in this window are a boot file, a font folder, the scrap directory, the system directory and a number of directories. The title of the window shows the filing system (ADFS), the name of the disc (HardDisc) and the directory being shown (*$* – the root directory). Clicking Menu over this window brings up the Filer menu, which looks like this:



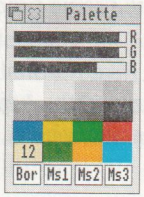


Application icons appear on the right-hand side of the iconbar. In this screen shot the applications from left to right are: *Help*, *Draw*, *Edit*, *Paint*, and *Impression*. The two on the right (*Palette* and the Task manager) are special, and are described below. Click Menu over any icon to bring up an iconbar menu, which will include the Quit option to kill off the application. Not all applications install themselves on the iconbar in this way, but the vast majority do.

Device and filing system icons appear on the left-hand side of the iconbar. Devices represent printers, faxes and so on: hardware add-ons to which files can be sent. Filing systems are for file storage and include hard discs, floppy discs and the Ram disc. In this example, from left to right, we have a hard disc (called HardDisc), floppy drive 0, the resources filing system and the Ram disc. The resources filing system contains the Rom applications and the built-in fonts (Corpus, Homerton and Trinity). Clicking Select on a filing system icon brings up a directory window for that system, and clicking Menu brings up a menu relevant to that system; on the right is the menu for floppy drive 0.



The *Palette* application lets you change the screen mode and colours on the desktop. Click Menu to bring up the menu: the Mode submenu allows you to change screen mode. Click Select to bring up the palette editor window (shown right).



The Task manager forms the crux of the desktop's memory management system. Click Select on the icon to bring up the Tasks window, showing the memory allocations for such items as the font cache, Ram disc, screen memory, the module area and all the applications loaded. From the iconbar menu you can save boot files (see page 23), create task windows, and shut the system down.

Using your mouse efficiently

Knowing how to use your mouse efficiently helps to keep your desktop clear, and makes working with files that much easier. When you are copying or moving files, there are a number of short cuts which, once learned, prove invaluable. Here's a quick summary of some of the rules.

- Double-clicking or dragging anything in a directory window with Adjust instead of Select has exactly the same effect, except the directory is closed after the action is performed. So, double-clicking on an application with Adjust loads the application and closes the window, and dragging files with Adjust closes the source window.
- Clicking on the close icon with Adjust, rather than Select, still closes the window, but if it is a directory window the parent is opened, and if it is an editor window, the directory containing the file being edited is opened.
- Clicking on the close icon with Select and SHIFT held down iconises the window onto the Pinboard.
- Clicking on the close icon with Adjust and SHIFT held down doesn't close the window, but opens the parent directory or the directory containing the file.
- Copying files with SHIFT held down moves files instead of copying them. If the destination is on the same disc as the source, the files are renamed, which is far faster than copying and deleting.
- Dragging windows by the title bar or resizing windows using Adjust, rather than Select, still moves or resizes the window, but the window is not brought to the front: it is left in the same place in the window stack.
- Dragging scroll bars with Adjust allows both scroll bars to be dragged at the same time, allowing four-direction scrolling.
- The Pinboard acts just like normal directory windows, so double-clicking with Adjust on an icon on the Pinboard runs the object, and then removes the icon.

The Insider's Guide to Software

Buying the right software is a vital part of making the most of your system. Some areas are catered for by many products with varying specifications, and in some the choice is more limited. The choice depends on your exact needs, but an understanding of what is available is essential. Here's a guide to all the categories you will come across.

DTP and Word Processing applications are the most popular products on the Archimedes. The distinction between word processors and DTP packages is becoming more and more blurred, but basically a word processor is aimed at text work, and DTP software is more concerned with creating pages and layouts with text and pictures.

Word processors range from the simple, like *EasiWord* from Minerva, up to complex and powerful beasts like *EasiWriter* and *TechWriter* from Icon Technology. Word processors always used to print out using the printer's own built-in font, but these days most can cope with outline fonts as well. DTP packages, on the other hand, always use outline fonts, and include features such as frames and styles. The two contenders in the DTP market are *Impression* from Computer Concepts and *Ovation* from Risc Developments: the former is the more powerful of the two, but is also more expensive.

Whether you need a word processor or a DTP package depends on what you need. For letter creation and text-based documents, a word processor will suffice. However, if you want to create magazines or newsletters, you will need the power and flexibility of DTP.

Databases store and manipulate data. The most basic databases, such as *Masterfile III* from Risc Developments, are, effectively, computerised card indexes, and can be searched for matches in the various fields on the card. More advanced databases, such as Longman Logotron's *S-Base*, are 'relational', which means they can link various items of data in all sorts of advanced ways.

Database features vary immensely. For example, Digital Services' *Squirrel* implements the standard query language of databases, *PinPoint* (Longman Logotron) is aimed at educational database use, *S-Base* (Longman Logotron) is fully programmable in a fourth generation language called 'S', and Iota's *DataPower* is very DTP-influenced,

Spreadsheets manipulate numbers in a variety of different ways. The standard spreadsheet system consists of a table of 'cells', each of which can contain numbers or text. Cells can be linked together so that one cell, for example, will contain the sum of the numbers in two other cells. The display is dynamically updated, so changing the value in one cell will affect the whole spreadsheet.

Most advanced spreadsheets also have a graphing capability, so you can create graphs and charts from the data in the sheet. Failing this, you can always export data as a CSV file (comma separated values) and produce a graph using a stand-alone package like *ChartWell* (Risc Developments) or *GraphBox* (Minerva Software). The most popular spreadsheets are *Eureka* (Longman Logotron), *Schema* (Clares) and *Resultz* (Colton).

Integrated Packages have started to take off on the Acorn platform. *Pipedream* from Colton Software started the ball rolling with its combined word processor, spreadsheet and database capabilities. Colton has advanced its integration concept with

the trio of *Wordz*, *Resultz* and *Recordz*, which will work individually as word processor, spreadsheet and database, or will combine to form a fully integrated package.

The other major integrated package is *Advance* from Acorn, which combines special versions of *Impression Junior*, *DataPower* and *Schema*, integrated to form a uniform working environment. The best thing about *Advance* is its price: for around £100 you get three major applications.

Graphics software covers a wide range of features, but there are three basic flavours. The first is the 'vector' type, in which objects such as circles and lines are created and manipulated. The two major vector packages on the Archimedes are *Vector* from 4Mation, and *Artworks* from Computer Concepts. *Draw*, which comes with Risc OS, is a typical example of a vector package.

The second type is 'bitmap' graphics, in which you paint pixels. *Paint*, part of Risc OS, is a primitive painting package, but applications such as *ProArtisan 2* (Clares), *Revelation II* and *Revelation ImagePro* (Longman Logotron) and *Atelier* (Minerva) have far more features for the budding artist.

The final type is 'image processing' software, such as *Imagery* from Palette Studio and *Revelation ImagePro* (which is also a painting package). These packages deal with manipulating pictures, and are often used to enhance sprites which have been digitised or scanned.

Also, there are graphics packages which do not readily fit into any of the above categories. Ray-tracing packages, such as *Render Bender* and *Illusionist* from Clares, create pictures of scenes by calculation, and *Titler* (Clares) and *CableNews* (Lingenuity) concern themselves with creating presentation graphics such as slides and screen demonstrations. There are also educational packages like *PrimeArt* (Minerva) and *Kid Pix* (ESM) which are specifically aimed at children.

Multimedia is a term which is tricky to define. Multimedia authoring applications enable you to create multimedia presentations which can contain text, graphics, full motion video and sound, hence the name multimedia. *Magpie* from Longman Logotron and *Genesis* from Oak Solutions are the two leading authoring packages, and even presentation packages like *CableNews* (Lingenuity) could be classed under multimedia authoring.

Both *Magpie* and *Genesis* have stand-alone browsers which enable anyone to view a multimedia 'book' without having to purchase the full authoring system. Multimedia CD-Roms are starting to appear in large numbers, and Acorn's involvement in the European MultiWorks project ensures that CD-Roms released in this format for the PC and Unix platforms will also work under Risc OS.

Communications software is essential if you need to use a modem, and the Archimedes is well supported with high quality comms packages. The most popular are *Hearsay II* (Risc Developments), *Arcterm 7* (The Serial Port) and *ArcComm 2* (Longman Logotron), and there are a number of public domain applications around to enable you to connect to bulletin boards via modem.

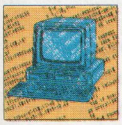
When buying comms software, you should check that there is a driver for your particular modem, as modems differ from each other in the same way that printers do.

Some very sophisticated **Music** software is available for the Archimedes. The first category is musical notation, where the two main contenders are *Rhapsody II* from Clares and *Notate* from Longman Logotron. *Maestro*, which comes bundled on the Risc OS applications disc, is a good introduction to musical notation packages.

The next category concerns Midi sequencing, where the main packages are *Studio 24+* from EMR, and *Serenade* from Clares. These packages provided sophisticated recording and editing for Midi instruments, and along with these two core applications there are other Midi packages like the drum sequencers *Rhythm-Bed* (Clares) and *Rhythm Box* (EMR).

Next up is the world of soundtracker tunes, which have come from the Amiga world. These files create tunes by stringing samples together in a sequence, and most game sound tracks are in soundtracker format. *Tracker* (The Serial Port) and *Digital Symphony* (Oregan) represent the present market in soundtracker editors.

Finally there are the sound sample editors. Sound samples can be captured using various hardware add-ons (such as Oak Solutions' Arc Recorder), and can be manipulated using packages like *Armadeus* (Clares) and *AudioPhile* (Computer Concepts).



Programming is a vital part of any computer system. Various languages are available for the Archimedes, including Basic (built-in), C, Assembler, Pascal, Fortran and Logo. Along with these languages there are a number of programming utilities such as the program editors *DeskEdit 2* (Risc Developments), *DBEdit* (4Mation), the Desktop Development Environment for Assembler and C, and various collections aimed at Wimp programmers.

Utilities is a category that includes a whole range of applications which improve your machine. Useful utilities include hard disc backup software, mouse recording, disc editors, desktop tools (like dustbins and enhanced pinboards), knowledge organisers, anti-virus software like Pineapple's *Killer*; the list goes on and on.

However seriously you use your computer, when you want to relax you need some **Games**. The Acorn games scene has really started to take off since the release of the A3010 which, with its built-in joystick ports, is aimed squarely at the home leisure market. Conversions from the Amiga world are becoming more and more common, and the amount of original software increases all the time. There are even programs to hack into games and give you loads of extra lives and things; *The Hacker* (DoggySoft) and *The Games Wizard* (Leading Edge) fill this niche.

Not so much a software category as a complete market in its own right, the **Public Domain** scene has never been bigger. When an author releases a product into the public domain, anyone can have a copy for free. A related concept is Shareware, where the product can be freely distributed, but users should register with the author by paying a one-off fee, normally something like £10. In return the author sends out upgrades and provides support. The best thing about the public domain is that you might find a gem of a program you can't live without. And if you don't, you haven't lost a thing.

Our final category is **Education**, which is potentially all-encompassing, since almost everything we've mentioned above can be put to good use in the classroom. However, the amount of software available specifically for the education market is huge on the Archimedes, and this is one reason why Acorn is the number one in schools.

Products such as *Fun School* (Europress), *Crystal Rainforest* (Sherston), *Freddy Teddy* (Topologika) and *Granny's Garden* (4Mation) are aimed straight at education, and packages like *Topographer* (Clares) manage to cross the barrier between education and the rest of the market.

Acorn Glossary

Computing is renowned for its use of acronyms, jargon and technical terminology. Don't let all those strange words confuse you: here's a guide to help you beat the boffins at their own game.

Adjust The name of the right-hand mouse button. See also *Menu*, *Select*.

Alarm An application in the resources filing system which allows you to set alarms to go off in the desktop. Also allows you to set the computer's clock and to display the time on the iconbar.

Anti-aliasing This is the method used to improve the quality of outline fonts on screen. Instead of printing pixels in each character in only black or white, pixels at the edges of characters are printed in varying shades of grey, so blurring the edges and improving the quality on screen. See also *Font Cache*, *Font Manager*.

Application The name given to programs which run in the desktop, such as word processors, desktop publishing packages, databases, and spreadsheets.

Application Directory On disc, applications are stored as special directories whose names begin with an exclamation mark. If you double-click on an application directory the application is run, so to open an application directory you must hold down SHIFT when double-clicking. Application directories contain the main application program, template files, sprite files and any other resources that are needed.

Archimedes The name given to the first few 32-bit Acorn machines. The name has grown to mean any 32-bit Acorn machine, though strictly speaking only the following machines are Archimedes machines: A305, A310, A440, A410/1, A420/1, A440/1 and A540. All other 32-bit machines are referred to as Acorn machines, so although the following machines are not really Archimedes machines, most people still call them that: A3000, A3010, A3020, A4000, A5000 and A4. All these machines can be fitted with Risc OS 3, so the only differences between all the models are in speed and expansion capability.

Arm The name of the CPU in the Archimedes. Arm used to stand for Acorn Risc Machine as the Arm2 was developed by Acorn, but it now means Advanced Risc Machine, and Arm chips are designed by Arm Ltd. See also *FPA*, *IOC*, *Memc*, *Vidc*.

Arm Code The language which the Arm chip understands. A representation of this language is assembly language, but actual Arm code is just a sequence of numbers which are fed into the Arm chip. See also *Assembly Language*.

Arthur The Archimedes operating system before Risc OS came along. See also *Risc OS*.

Ascii American Standard Code for Information Interchange. This is simply a table which contains standard codes for computer characters, so the Ascii code for a capital 'A' is 65. Almost every application which deals with text can accept text files containing Ascii codes, so you can exchange information between applications by saving as Ascii text, even if you can't save files directly from one application to the other.

Assembler An application which converts a program in assembly language into Arm code. Basic contains an assembler, as does the DDE. See also *Arm Code*, *Assembly Language*, *DDE*.

Assembly Language The language which describes the instructions the Arm chip can execute. For example, the instruction `MOV R0,R1` copies the value of register R1 into register R0. See also *Assembler*, *Machine Code*.

AUN Acorn Universal Networking. This is a standard set of protocols created by Acorn which allows Econet and Ethernet networks to be connected together. See also *Econet*, *Ethernet*.

Basic The programming language which comes free as part of Risc OS. A lot of Archimedes applications are written in Basic, such as *Alarm* and *Help*. Basic programs can be edited using *Edit*. See also *C*.

Bitmap Graphics Sprites are examples of bitmapped graphics. Bitmap simply means that pictures are made up of dots (pixels), rather than lines and circles. See also *Vector Graphics*.

Bit Binary digIT. A binary digit is either 1 or 0, and is the smallest piece of data a computer can deal with. See also *Byte*, *Kilobyte*, *Megabyte*.

Boot File Boot files can be created using the Task manager (see page 23). A boot file contains details of which applications you have loaded, any windows you have open, and any modules you have loaded. The system can be set up to run this boot file whenever you switch the machine on, so you can have your favourite applications loaded automatically whenever you use your machine. See *Task Manager*.

Byte Eight bits. A byte can have any value between 0 and 255: one byte in memory can store one character. See also *Bit*, *Kilobyte*, *Megabyte*.

C A programming language which is popular on many computer platforms, including the Archimedes.

Cad Computer Aided Design. The use of computers to design buildings, PCBs and suchlike.

Calc An application in the resources filing system which provides a desktop calculator. See also *SciCalc*.

Caret The vertical bar which shows where text will appear when you type. The normal colour for the caret is red. See also *Input Focus*.

CD-Rom Compact Disc Read Only Memory. A CD-Rom is a compact disc which contains computer data. The CD-Rom player is connected to the computer via a SCSI interface and appears on the left side of the iconbar just like other storage devices. Access time is somewhat slower than a hard disc, but the amount of data that can be stored on a CD-Rom is very large – typically up to 660Mb or thereabouts. CD-Rom is often used to distribute large amounts of data, such as might be found in a multimedia encyclopedia or a large clip art library

ChangeFSI One of the applications provided on the Risc OS 3 applications discs. *ChangeFSI* is an image manipulation and conversion application; the *FSI* part of the name stands for Floyd-Steinberg Integration, one of the algorithms used for dithering in the application (dithering is a method for producing more colours on the desktop). See also *Bitmap Graphics*, *Sprite*.

Chars An application in the resources filing system which provides a window from which all the characters in the character set can be accessed. Clicking on a character enters it at the caret; the alternative is to hold down ALT and type the Ascii code of the character on the numeric keypad. See also *Ascii*.

CMOS Ram A part of the computer's Ram which retains its contents through battery power. The configuration settings are stored in this area. Early Archimedes models had normal batteries powering this memory; later machines have trickle-charge Nickel-Cadmium batteries which do not need replacing. The CMOS Ram can be set to the factory defaults by holding down 'R' while switching on the computer. See also *Configure*.

Configure An application in the resources filing system which enables the system to be set up as required. The settings chosen are stored in CMOS Ram and are retained even when the machine is switched off. For details of the best configuration settings, see page 18. See also *CMOS Ram*.

CPU Central Processing Unit: the heart of the computer. The CPU in the Archimedes is the Arm chip, of which there are a number of varieties. The Arm2 is the slowest, followed by the Arm250, then the Arm3, and then the Arm6 and Arm7. See also *Arm*.

Cursor This is a term for a flashing block or line which can be moved around the screen while editing files in some editors. This concept is no longer common in the desktop environment as the caret is the preferred way of showing the input focus. The cursor still appears outside the desktop. See also *Caret*.

Database An application which is used to store and retrieve data.

DDE Desktop Development Environment. Acorn's software development package which provides a desktop-based environment for developing programs in assembly language and C.

Desktop The environment in which multi-tasking applications run. The desktop is a Wimp environment and is the heart of the Risc OS system as far as the user is concerned. See also *Multi-tasking*, *Wimp*.

Dialogue Box A window which contains a number of icons, and often OK and Cancel buttons. Dialogue boxes can be accessed via menus, as a result of choosing menu options, or by clicking on specific icons. Examples of dialogue boxes are *Paint*'s Snapshot dialogue box and *Draw*'s Zoom box.

Directory A storage area on disc in which files can be kept. The concept is analogous to an office filing system, where each directory can be viewed as a folder containing files and possibly other directories. See also *Application Directory*, *Filer*.

Double-click The act of clicking a mouse button twice quickly in succession. Double-clicking on applications runs them; double-clicking on files loads them; double-clicking on directories opens them.

DTP Desktop Publishing is the creation of documents on a computer. These days most magazines and newspapers are put together on computer using DTP software, and this handbook was created entirely using Computer Concepts' *Impression* DTP software. The other Acorn DTP package is *Ovation*.

Draw An application in the resources filing system which provides a tool for creating vector graphics illustrations. The *Draw* file is a standard file format in Risc OS, and a lot of clip art is supplied in this form.

Econet Acorn's low-cost proprietary networking system, first created back in the early 1980s. It is still available as a plug-in upgrade for the Archimedes, and fits in to Acorn's AUN networking system. Econet is, however, rather dated when compared to Ethernet. See also *AUN*, *Ethernet*.

Edit An application in the resources filing system which allows you to edit files of any type. *Edit* is a file editor, rather than a word processor, and is more useful for creating programming files such as Basic programs, Obey files and help files.

Error Box The window that pops up when an error occurs. The window can have an OK icon, a Cancel icon, or both. An example of an error box can be seen if you click on a floppy disc drive icon when the drive is empty. For an explanation of the most common errors and how to cope with them, see page 20.

Ethernet A fast, international networking standard. It is suitable for networks which use a lot of data transfer. The AUN system enables Ethernet to be linked up to Econet networks so each can access the other's computers. See also *AUN*, *Econet*.

Expansion Card The name for any card which plugs into the machine. Large-box machines such as the A5000 can take up to four cards, but smaller machines like the A3010 can only take one card internally. See also *Podule*.

Filer The part of Risc OS which deals with files. When you click on a disc drive icon, the Filer puts up a directory window, and clicking Menu over this window brings up the Filer menu.

Fileserver A machine on a network which stores files on its hard disc that can be accessed by other computers on the network. See also *Network*.

Floppy Disc Every Archimedes is fitted with a 3.5in floppy disc drive. The floppy disc drive appears on the left-hand side of the iconbar and is normally labelled ':0', meaning the drive number is zero. Old Archimedes machines can only access double-density discs (800K), but newer machines can also access high density discs (1.6Mb).

Font Cache An area of the computer's memory in which font definitions are stored. When a font is loaded from disc, the font outline definition is used to calculate an anti-aliased bitmap to display on screen. This is stored in the font cache so if the font needs to be displayed again, it can simply be pulled from memory, which is quicker than calculating the bitmap again. Having a larger font cache will speed up font displaying, but will also take up precious memory. The size of the font cache can be set using the Task manager, or can be set permanently using the *Configure* application. See also *Anti-aliasing*, *Font Manager*.

FontEd Acorn's application for designing outline fonts. Useful for tweaking existing fonts, or changing font names.

Font Folder The area on disc where outline font definitions are stored. The folder is normally called *!Fonts*, and any additional font definitions should be

copied into this application (see page 22). If this is done correctly, the new font names will appear in application font menus. See also *Font Manager*.

Font Manager The part of Risc OS which deals with outline fonts on screen. The font manager looks after the font cache, performs anti-aliasing on outline fonts for the screen display, and keeps track of which fonts are available from the Font folder. See also *Anti-aliasing*, *Font Cache*, *Font Folder*.

Format Both floppy and hard discs need to be formatted before they are used. Formatting maps out the disc into sectors and tracks so the disc drive head can move to the right areas on the disc. There are various formats available, the most common of which is ADFS 800K (E).

FormEd Acorn's application for editing and creating template files. Template files contain window definitions and are stored inside application directories. Using template files is more convenient than having to define windows in code.

FPA Floating Point Accelerator. An optional chip upgrade which speeds up floating point assembly instructions. Machines such as the A5000 and A540 have sockets ready for the FPA chip, and Arm2 machines can be upgraded to an Arm3 with FPA. Arm250 machines cannot take the FPA chip.

Hard Disc A fast, high capacity disc which can be fitted internally or externally. There are three types of hard disc, namely ST506, which is now obsolete, IDE and SCSI. IDE is cheaper and slower; SCSI is more expensive and faster. See also *IDE*, *SCSI*.

Help Acorn's interactive help application, which is provided in the resource filing system. Many applications provide context-sensitive help and interface with *Help*, displaying information about what is under the pointer: menu items, icons, windows and so on.

Icon An icon is any rectangular area of the screen. Icons can contain sprites, text or a mixture of both. Sometimes clicking on an icon will cause something to happen, sometimes not. Typical examples of icons are those on the iconbar, those in directory windows, and OK and Cancel buttons in error boxes.

Iconbar The light-grey bar along the bottom of the desktop. Most applications install themselves on the right-hand side of the iconbar, and devices such as printers and disc drives appear on the left-hand side.

IDE Integrated Drive Electronics. The name given to the type of hard disc drive which has the disc controller integrated as part of the disc drive unit. Cheap and easy to fit, the choice for upgrading your Archimedes with a hard disc lies between IDE and SCSI. See also *Hard Disc*, *SCSI*.

Input Focus When the caret is inside a particular window, that window is said to have the input focus; if a window has the input focus and it is not a dialogue box in a menu structure, then the border of that window will go cream. If you press any keys, then these are reported to the application with the input focus, so if keypresses seem not to be working, check the position of the caret. See also *Caret*.

IOC The member of the Arm chipset that looks after input and output. The chip provides the facilities to manage interrupts and peripherals within the computer. See also *Arm*, *FPA*, *Memc*, *Vidc*.

Joystick Used for playing games. Adding digital joysticks to an A3010 is easy, as there are two joystick ports on the back of the computer. Third-party joystick interfaces are available for other models, and the DeltaCat joystick plugs into the mouse port, providing analogue joystick control for flight simulators and similar games. Most new games take advantage of the A3010's joystick ports.

Kilobyte A kilobyte (K) is 1024 bytes. The number is 1024 rather than 1000 as 1024 is 2^{10} (two to the power of ten). So 32K is in fact 32 × 1024 bytes, or 32768 bytes. See also *Bit*, *Byte*, *Megabyte*.

Machine Code In the Archimedes context, this is a name for Arm code. In the more general sense, this is the name for code which the CPU itself executes: it is normally represented by sequences of numbers. See also *Arm Code*.

Maestro One of the applications provided on the Risc OS applications discs. *Maestro* allows entry of musical scores, and enables them to be played back.

Megabyte A megabyte (Mb) is 1024 kilobytes. So 4Mb is 4 × 1024 kilobytes, or 4194304 bytes. See also *Bit*, *Byte*, *Kilobyte*.

Memc The member of the Arm chipset that provides the interface between the other three and the computer's memory. See also *Arm*, *FPA*, *IOC*, *Vidc*.

Memory Strictly speaking 'memory' refers to both Rom and Ram, but more often than not it refers to Ram. The larger the amount of memory you have in your machine, the more powerful it becomes. See also *Ram*, *Ram Disc*, *Rom*.

Menu The name of the middle mouse button. See also *Adjust*, *Select*.

Mips Million Instructions Per Second. A measure of a CPU's speed. An A5000, which contains the Arm3 processor, manages about 13mips, whereas the Arm2 in older machines such as the A3000 manages between about 3 and 5mips.

Mode The screen mode used determines the resolution of the display and the number of colours which can be shown on screen at any one time. For example, Mode 12 has a resolution of 640 × 256 pixels with 16 colours, and Mode 21 has a resolution of 640 × 512 pixels with 256 colours. Higher quality screen modes make the computer run more slowly, and they also require better monitors. Screen mode can be changed using the *Palette* application. See also *Monitor*, *Palette*

Modem Short for MODulator-DEModulator. A device which connects to a telephone line to enable your computer to communicate with other computers on the phone. Bulletin boards and electronic mail (e-mail) can be accessed using a modem and suitable software.

Module Simply another name for a relocatable module. See *Relocatable Module*, *RMA*.

Monitor A screen display. There are three different types of monitor the Archimedes can be connected to: standard, VGA and multisync.

Mouse The three-buttoned input device that plugs into the keyboard. The buttons are named, from left to right: Select, Menu and Adjust.

Multimedia Not very easy to define, this term. Loosely speaking, multimedia concerns the integration of sound, graphics, text, video, database technology and any other elements that can be dreamed up. Multimedia applications include encyclopedias, illustrated databases, educational quizzes that incorporate Replay movies and so on. See also *CD-Rom*, *Replay*.

Multi-tasking When an application is running in the desktop at the same time as other applications, it is said to be multi-tasking. Risc OS (and, indeed, most multitasking operating systems) has co-operative multitasking. This means that the Wimp gives control to each application in turn, and waits for the application to hand control back; so if the system is to work efficiently, applications must not hog the processor, or the whole machine will slow down very noticeably.

Network The name given to a collection of computers all connected together by cable. The two most popular Archimedes networks are Econet and Ethernet. See also *Econet*, *Ethernet*, *Fileserver*.

Operating System The operating system on any computer is the most important piece of software, and controls every aspect of the machine from scanning the keyboard to displaying windows. On the Archimedes the operating system is called Risc OS. See *Risc OS*.

Option Icon Option icons are square and can be toggled on and off by clicking Select or Adjust over them. Option icons show whether a certain option is enabled or disabled. See also *Icon*, *Radio Icon*.

Paint An application in the resources filing system which enables sprites to be created and edited. See also *Bitmap Graphics*, *Sprite*.

Palette The application that resides on the right-hand side of the iconbar. *Palette* enables you to change the colours used on the desktop, and the screen mode.

Parallel Port A port on the back of the computer to which a parallel printer can be connected. On later machines the port is bi-directional, which means information can pass both ways through the port, rather than just from the computer to the printer. This enables expansion options like SCSI and Ethernet to be connected to the parallel port, which is invaluable for A4

portable users. Hardware protection devices, called 'dongles', are also connected to the parallel port to prevent software piracy.

Peripheral The generic name given to anything which connects to the computer externally. For example, monitors, printers and modems are all peripherals.

Pinboard The name given to the dark-grey backdrop of the desktop. Icons can be dropped onto the pinboard, and a sprite can be displayed as a backdrop instead of the normal grey colour.

Pixel PIcture ELement. This is the technical term for a dot on the screen. The more pixels that can be displayed in a specific screen mode, the higher the resolution and the clearer the display. For example, Mode 12 has a resolution of 640 × 256 pixels, whereas Mode 20 is 640 × 512 pixels; as a result Mode 20 looks much better than Mode 12. However you do need a multisync monitor to display Mode 20.

Podule The colloquial name for an expansion card. See also *Expansion Card.*

Pointer The name for the little arrow on the desktop which you control with the mouse.

PostScript Back in the early 1980s Adobe invented the PostScript language for describing the layout of pages. PostScript is now the standard page description language, and is the way that the Archimedes can send documents to a typesetter.

Printer Anything which can be connected to a computer to produce hard copy. The most popular types of printer are ink-jet and laser, with dot-matrix becoming less popular as the prices of better quality printers fall.

Printer Manager The Acorn application which enables other applications to print to the multitude of different printers available. The application tells the printer manager what to print, and the printer manager then looks at the printer definition file it has loaded and talks to the printer in its own language.

Program A file containing instructions in a certain language, like Basic or C. When a program is run, it performs some action; for example, if the program is

packaged up as part of an application, then it will probably install itself on the iconbar. See also *Basic*, *C*.

Programmer's Reference Manual Commonly abbreviated to PRM. This four-volume tome is the programmer's bible for Risc OS. Every aspect of the operating system is covered in over 3000 pages, so you will often see the phrase 'see the PRM for more details' when there is not enough space to cover a certain topic in a programming article.

Radio Icon Radio icons are diamond shaped and can be toggled on and off by clicking Select or Adjust over them. Radio icons are so-called because toggling one on turns all the other off, and only one can be on at any one time; this is similar to the band selector on a radio. Radio icons enable just one of a set of mutually exclusive options to be chosen. See also *Icon*, *Option Icon*.

Ram Random Access Memory. Memory which is cleared when the machine is switched off. See also *Memory*, *Rom*.

Ram Disc An area of memory which is set aside using the Task manager for use as temporary storage. The Ram disc appears on the left-hand side of the iconbar and acts like a normal disc, except it is very fast and all the data stored in the Ram disc is lost when the machine is switched off.

Relocatable Module The operating system is made up of relocatable modules which live in the RMA (the Relocatable Module Area). Modules are Arm code programs which can be loaded and run anywhere in the RMA, hence the 'relocatable' part of the name. The beauty of the module system is twofold. First, upgrades to the operating system can be sent out as modules on disc which can then simply be loaded into the RMA, replacing the relevant Rom modules. Second, users can write their own modules to extend the operating system; a good example is the *VProtect* module from Pineapple which sits in the RMA, constantly guarding against virus infection from disc. See also *RMA*.

Replay An Acorn application which enables full motion video to be played in a window on the desktop. Replay DIY is a package to enable Replay movies to be created at home. The main use for Replay files is in multimedia applications.

Resource Filing System The filing system which contains the applications *Alarm*, *Calc*, *Chars*, *Configure*, *Draw*, *Edit*, *Help* and *Paint*, as well as the Corpus, Homerton and Trinity fonts and all the other resources required by the desktop. The icon for the application section of the resource filing system appears on the left-hand side of the iconbar.

Risc Reduced Instruction Set Computer. This is a way of designing CPUs, and the Arm chip is a Risc chip. This means that there are very few instructions in Arm assembly language, and the chip executes instructions very fast. Risc technology is the way all major chip manufacturers are heading.

Risc OS Stands for Risc Operating System. Pronounced 'Risk Oh Es'. Risc OS deals with everything from making sure the screen is displayed correctly to checking the keyboard and displaying what is typed. Risc OS is made up of relocatable modules, and is provided on four Roms which plug into sockets inside the computer. See also *Relocatable Modules*.

RMA Relocatable Module Area. This is the area of memory where relocatable modules are loaded, and also the area where Rom-based modules (those which make up Risc OS) can store values (as Rom is non-writable). See also *Relocatable Module*.

Rom Read Only Memory. Memory which is permanent, and is not wiped when the machine is switched off. Risc OS is provided in Rom, as is software on expansion cards. See *Memory*, *Ram*.

SciCalc An application from the Risc OS applications discs. Provides a sophisticated scientific calculator on the desktop. See also *Calc*.

Scrap Directory The scrap directory is situated in the application directory called *!Scrap*. It is a place where applications can temporarily store data, most often when transferring files from one application to another. When a file is transferred, the source application saves the file into the scrap directory, and the destination application loads it from there.

Scroll Bars The vertical and horizontal bars on the right-hand and bottom edges of windows. They enable you to move round documents.

SCSI Small Computer Systems Interface. Pronounced 'Scuzzi', this is the means of connecting tape streamers, CD-Rom drives, SCSI hard discs and so on to your Archimedes. Devices are daisy-chained together up to a total of eight in all (including the Archimedes as one). SCSI hard discs are faster than IDE drives, but do cost more. See also *Hard Disc*, *IDE*.

Select The name of the left-hand mouse button. See also *Adjust*, *Menu*.

Serial Port A port on the back of the computer to which serial devices such as modems and serial printers can be connected.

Shutdown This is what every Archimedes user should do before switching off the computer. Shutdown can be performed by pressing SHIFT-CTRL-F12 in the desktop: all files are closed, you are warned if you have work you haven't saved, the hard disc heads are parked, and, if you are connected to a network, you are logged off. If is a good habit to get into every time you reach for the power switch.

Spreadsheet An application used for managing columns of numbers: spreadsheets are to numbers what word processors are to letters.

Sprite A sprite is simply a rectangular array of pixels which together make up a picture. Sprites crop up everywhere on the desktop: iconbar icons invariably contain sprites; each application has its own sprite displayed in directory windows; the up- and down-arrows in *Draw*'s Zoom dialogue box are sprites. Sprites are created and edited with *Paint*.

System Folder The system folder is a vital part of the Archimedes system. The application directory *!System* contains modules which need to be shared between applications. For example, when an application needs to load the *BASIC64* module to perform high-precision calculations in Basic, it will look in the System folder for the module. If any modules are released which need to be shared between applications (like bug fixes to the operating system, for example), then you can add them to your System folder using the *SysMerge* application, and all your applications will know where to find them. A manual method of adding modules is described on page 22.

Task Manager The Task manager is the Acorn icon on the far right of the iconbar. This application has many uses, the most important of which is memory allocation. The Tasks window can be brought up by clicking Select on the icon; from here you can set the amount of memory allocated to the font cache, the Ram disc and so on. The Task manager also allows you to create boot files (see page 23).

Toggle To toggle means to flick a switch between on and off. Option and radio icons are toggled when you click on them with Select or Adjust.

VDU Video Display Unit. Another name for a monitor.

Vector Graphics As opposed to bitmap graphics which are simply made up of dots, vector graphics are made up of objects. Objects can be lines, curves, sprites and so on, and can be operated on separately or in groups. *Draw* is a good example of a vector graphics application. See also *Bitmap Graphics*.

Vidc The member of the Arm chipset which deals with the video display and the computer's sound. See also *Arm*, *FPA*, *IOC*, Memc.

Virus A program that spreads itself by cloning itself and attaching itself to other programs. Some viruses are harmless, others can cause serious damage, such as wiping hard discs clean. Viruses can be detected and removed using applications such as Pineapple's *Killer*. It is illegal to create and knowingly distribute viruses.

Wimp Windows, Icons, Menus, Pointer. This describes the desktop on the Archimedes, and is a generic term for describing this type of graphical user interface. The Macintosh and PCs also have Wimp interfaces, namely System 7 and Windows respectively.

Windows These appear on the desktop and contain directory displays, documents, error messages and so on. The foundation of the desktop.

Write-protect The act of moving the little shutter on a 3.5in disc so that you can see through the hole. When the disc is in this state, the disc drive cannot write to the disc; an error saying 'Protected disc' appears if you try. This is a useful way of preventing accidental file deletion.

Telephone Numbers

The following are telephone numbers for the companies mentioned in this handbook.

4Mation	(0271) 25353
Ace Computing	(0274) 211760
Acorn	(0223) 254254
Aleph One	(0223) 811679
Arm Ltd	(0223) 813000
Canon	(0800) 252223
Clares	(0606) 48511
Colton Software	(0223) 311881
Computer Concepts	(0442) 63933
Digital Services	(0705) 210600
DoggySoft	(0494) 431916
EMR	(0702) 335747
ESM	(0223) 65445
Europress Software	(0625) 859333
Gremlin	(0742) 753423
HCCS	091-487 0760
Hewlett-Packard	(0344) 369222
Icon Technology	(0533) 546225
Iota Software	(0223) 421542
Krisalis	(0709) 372290
Leading Edge	(0532) 436300
Lingenuity	(098685) 477
Longman Logotron	(0223) 425558
LOOKsystems	(0603) 764114
Minerva	(0392) 437756
Oak Solutions	(0274) 211760
Oregan	021-353 6044
Palette Studio	(0733) 344245
Pineapple Software	081-599 1476
Risc Developments	(0727) 840303
Sherston Software	(0666) 840433
Star	(0494) 471111
State Machine	(0582) 485151
Taxan	(0344) 484646
The Serial Port	(0749) 670058
Topologika	(0733) 244682

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